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A.D. 1904

(Under International Convention.)

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### COMPLETE SPECIFICATION.

#### "Improvements relating to Syringes for the Injection of Plastic Substances"

I, MARC LUCIEN JACQUES LAGARDE, of 28 Place St. Ferdinand, Paris, in the Republic of France, Doctor of Medicine, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

- 5 For a period of two years past prosthesis has been effected by means of injections of paraffin. The principle of this process consists in the interstitial sub-mucous or subcutaneous injection of a substance fusible by heat, capable of solidification on cooling, for the purpose of correcting certain acquired or congenital deformities or of restoring a weakened or lost function.
- 10 The defects which are chargeable to this method result from the facts:—
1. That the injection of a hot liquid may cause complications such as burns, post-operant oedema, fusion of the paraffin at a distance, phlebitis and so on.
  2. That the surgeon must operate with relatively considerable rapidity, which speed is necessitated by the rapid solidification of paraffin in the injection instruments.
- 15 This invention has for its object a novel syringe permitting of the injection in a cold state and with highly compressed paraffin, whereby the defects pointed out above are completely obviated.
- The high degree of compression to which the solid paraffin is submitted at the time of injection, produces sufficient liberation of heat to soften it and permit of its injection.
- In the accompanying drawing:—
- Figure 1 represents a syringe in longitudinal section and in its most simple constructional form.
- 25 Figure 2 is another longitudinal section of the same syringe, but with the addition of a part serving to increase the friction and consequently producing the heat necessary for softening the paraffin.
- The body *a* of this syringe, of metal, glass or other suitable material, differs from the ordinary patterns only by being provided with a collar *c* which surrounds it at its middle point and upon which is screwed a handle *d*, which permits of holding the instrument firmly during the operation. The piston and its rod *f*, however, present certain details which constitute the novelty of the instrument; this rod *f* is screw-threaded with a very elongated thread and it traverses an internally screw threaded cap *b* for the reception of the said rod which carries
- 35 at its free extremity a ring *g* or lugs.

The piston *e* is loose upon the rod *f* upon which it is able to rock slightly,

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*Improvements relating to Syringes for the Injection of Plastic Substances.*

in order to permit of its exact fitting and normal sliding in the cylinder *a*, without any wedging or binding.

The syringe may be filled with paraffin *i* either in a cold or hot condition; in the hot condition, this is effected by sucking in melted paraffin which is cooled within the instrument by means of a jet of ethyl chloride; in the cold condition, by introducing into the body of the syringe small cylinders of solid paraffin which have previously been sterilised.

In order to facilitate the compression and softening of the plastic substance there may also be introduced (see Fig. 2) at the bottom of the pump body a multiple draw plate *j* provided with longitudinal passages *k* terminating in an intermediate chamber *l* formed by a flange of the draw plate, between this latter and the perforated bottom of the pump *a*. When the piston *e* is acted upon for compressing the substance, this latter is obliged to pass through the passage *k* thereby imparting to it greater molecular division and affording a larger frictional surface, which heats the substance. This latter, in issuing from the passages *k* again mingles in the chamber *l* before leaving through the injection needle *h*.

In the case of the employment of solid paraffins, which is only possible with the instrument described above, the technique is extremely simple: After having adopted the usual aseptic precautions, and having had the region to be restored restricted as much as possible by a skilful assistant, the operator inserts the needle *h* at the spot chosen and causes the paraffin to issue gently until the desired correction has been effected. He then withdraws the needle and models finally the part upon which he has operated. A jet of ethyl chloride permanently solidifies the paraffin which has momentarily been softened by the compression.

In this manner it is possible to operate quietly and without any precipitation, by introducing the prosthetic substance drop by drop so to speak, if the restoration is delicate, and stopping from time to time, if necessary, so as to judge of the modifications obtained.

The technique being thus reduced to its most simple expression is rendered adapted for use by anyone.

Speed in carrying out the operation, which has hitherto been essential owing to the instantaneous solidification of the paraffin, no longer obtains with this novel technique, so that the operator cannot, even at the commencement, commit those faults which have been the cause of certain disastrous results, such as consecutive abscesses, phlebitis, burns, considerable post-operant oedema, paraffin tumour and so forth.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed, I declare that what I claim is:—

A syringe adapted to furnish a high degree of compression for the subcutaneous or submucous injection of cold plastic substances (paraffin, for example) comprising a principal body with the dismountable handle and a piston rocking upon a screw threaded rod which is rotated in order to compress and force the cold substance through the needle, the body of the syringe being provided if desired with a multiple draw plate for increasing the heating of the substance by friction substantially as described with reference to the accompanying drawings.

Dated: this 11th day of April, 1904.

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7 & 8 Southampton Buildings, London, W.C.  
Agents for the Applicant.

*[This Drawing is a full-size reproduction of the Original.]*

